

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

CIVIL ACTION
NO. 05-11443-GAO

ETHAN THOMAS
Plaintiff,

VS.

NEW ENGLAND FAST FERRY OF
MASSACHUSETTS, LLC, NEW
ENGLAND FAST FERRY COMPANY, LLC,
and INTERLAKE LEASING IV, INC.,
Defendants.

**DEFENDANTS' OPPOSITION TO PLAINTIFF'S MOTION TO STRIKE
CERTAIN EXPERT OPINIONS OF HENRY A. MCKENNA, P.E.**

Now come the defendants, New England Fast Ferry of Massachusetts, LLC, New England Fast Ferry Company, LLC, and Interlake Leasing IV, Inc., in the above entitled action, by and through their undersigned counsel, and file their Opposition to plaintiff's Motion to Strike Certain Opinions of Henry A. McKenna, P.E.

As grounds in support of their Opposition, the defendants submit the following for this Honorable Court's consideration.

BACKGROUND

On December 27, 2004 at 0650 hours, the MV WHALING CITY EXPRESS, owned by the defendant, Interlake Leasing IV, Inc. and chartered by the defendant, New England Fast Ferry of Massachusetts, LLC, departed from the State Pier Terminal in

New Bedford, Massachusetts bound for the ferry terminal in Vineyard Haven. The prevailing weather conditions over Vineyard Sound that morning were light snow with winds blowing 20 to 30 m.p.h. from the North.

The Woods Hole, Martha's Vineyard and Nantucket Steamship Authority [hereinafter referred to as "the Steamship Authority"] owns and operates the ferry terminal in Vineyard Haven. New England Fast Ferry of Massachusetts, LLC entered into a license agreement with the Steamship Authority that permits it to use dock and wharf facilities located in Vineyard Haven, Massachusetts.

At 0750 hours, the MV WHALING CITY EXPRESS arrived at the ferry terminal in Vineyard Haven. Before docking the MV WHALING CITY EXPRESS at Slip No. 2, the Steamship Authority dockworkers found it necessary to raise the transfer bridge by utilizing its winch's manual setting because its electric setting did not raise it to a sufficient height to accommodate the vessel's freeboard.

The Steamship Authority employed the plaintiff, Ethan Thomas, as a dockworker. On the date of the alleged incident, the plaintiff participated in the raising of the transfer bridge by turning its manual winch handle. As the plaintiff tried to turn the handle, it recoiled, and struck him in the head. After receiving the blow to the head, the

plaintiff fell to the ground, stood up, and was subsequently transported by a co-worker to the Emergency Room at Martha's Vineyard Hospital.

The plaintiff alleges that the MV WHALING CITY EXPRESS struck the transfer bridge at Slip No. 2 during its docking maneuvers with a force sufficient enough to cause the winch handle to recoil and strike him in the head.

In December 2005, the defendants retained the services of Henry McKenna, a mechanical engineer, who is a licensed professional engineer to examine the subject winch, its components and operation. *A copy of his Curriculum Vitae is incorporated within his expert report, which is appended to the plaintiff's motion as **Exhibit A**.*

In November 2006, counsels for the parties and Mr. McKenna traveled to the ferry terminal in Vineyard Haven to inspect the manual winch located on the Steamship Authority's transfer bridge. Thereafter, Mr. McKenna produced his written report as required under the Federal Rules of Civil Procedure. *See **Exhibit A** appended to the plaintiff's motion.* A copy of his report was produced to the plaintiff's counsel on April 30, 2007 as per this Honorable Court's Scheduling Order. The plaintiff counsel's made no objections concerning the content of Mr. McKenna's

report nor did he confer with defense counsel before filing the present motion with the Court on May 25, 2007.

As required under Federal Rule of Civil Procedure 26, Mr. McKenna's report includes the following information:

1. A complete statement of all opinions he intends to express at trial and the basis and reasons for these opinions: *See page 4, III Statement of Opinions;*
2. The data or other information that he considered in forming his opinions: *See page 6, V References;*
3. The exhibits that he intends to use as a summary of or support for his opinions: *See page 6, V References & VI Exhibits;*
4. His qualifications as a mechanical engineer, including a list of all publications authored by him within the preceding ten years: *See page 6, IX Publications or Papers by Author;*
5. The compensation to be paid to him for the study and testimony: *See page 6, VIII Compensation; and*
6. A listing of other cases in which he has testified as an expert witness at trial or by deposition within the preceding four years: *See page 7, X Case List.*

ARGUMENT

Before addressing the substantive arguments of the plaintiff's motion, the defendants report that the plaintiff's counsel has failed to comply with the requirements of Federal Rule of Civil Procedure 26 and the Local Rules of this Honorable Court prior to the filing of the plaintiff's Motion to Strike Certain Opinions of Henry

A. McKenna, P.E. Local Rule 7.1(A)(2) requires that counsel confer prior to filing any motions with the Court. Plaintiff's counsel did not confer with defense counsel prior to filing this motion in violation of Local Rule 7.1(A)(2). If plaintiff's counsel had conferred with defense counsel concerning any purported deficiencies with Mr. McKenna's report as required under the Local Rules, the defendants would have been required to supplement the "information contained in the report and to information provided through a deposition of the expert." See **Fed.R.Civ.P. 26(e)(1)**.¹ Since plaintiff's counsel chose not to obtain Mr. McKenna's deposition nor confer with defense counsel concerning any purported deficiencies within Mr. McKenna's report or his qualifications as an expert, the plaintiff now seeks an order from this Honorable Court to

¹ Federal Rules of Civil Procedure Rule 26

(e) Supplementation of Disclosures and Responses. A party who has made a disclosure under subdivision (a) or responded to a request for discovery with a disclosure or response is under a duty to supplement or correct the disclosure or response to include information thereafter acquired if ordered by the court or in the following circumstances:

(1) A party is under a duty to supplement at appropriate intervals its disclosures under subdivision (a) if the party learns that in some material respect the information disclosed is incomplete or incorrect and if the additional or corrective information has not otherwise been made known to the other parties during the discovery process or in writing. With respect to testimony of an expert from whom a report is required under subdivision (a)(2)(B) the duty extends both to information contained in the report and to information provided through a deposition of the expert, and any additions or other changes to this information shall be disclosed by the time the party's disclosures under Rule 26(a)(3) are due.

strike several of his opinions simply based upon his counsel's review of the report and his evaluation of its reliability and sufficiency.

The defendants believe that the plaintiff and his counsel have engaged in unnecessary motion practice and their methodology to strike Mr. McKenna's opinions is prohibited under Federal Rule of Civil Procedure 26 and the Local Rules of this Honorable Court. Accordingly, the defendants contend that since Local Rule 7.1(A)(2) has not been satisfied and the plaintiff's counsel has failed to comply with the requirements of Federal Rule of Civil Procedure 26, this Honorable Court should properly deny the plaintiff's motion.

In response to the plaintiff's Motion to Strike, the defendants support the opinions and conclusions proffered by Mr. Hank McKenna in his report. His opinions and conclusions are valid, well-supported, and reliable for submission as opinion evidence in this matter. His report and the opinions and conclusions contained therein will assist the jury in evaluating the merits of the plaintiff's allegations. Accordingly, this Honorable Court should properly permit the jury to receive his opinions and evaluate Mr. McKenna's testimony including the factual and

technical basis for his opinions, which meet the reliability criteria of ***Daubert v. Merrell Dow Pharm., Inc.***, 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993).

To be admissible, evidence must be relevant; it must meet special requirements if presented as expert testimony (e.g., the expert must be qualified and the subject must be fit for expert testimony); and it should be properly excluded if its unfair prejudicial effects substantially outweigh its probative value. ***Baker v. Dalkon Shield Claimants Trust***, 156 F.3d 248, 252 (1st Cir. 1998) citing to ***Fed.R.Evid. 401, 702, 403***.

The determination whether a particular witness is qualified to testify as an expert witness is for the Court's determination under Federal Rule of Evidence 104(a).² A District Court must act as a "gatekeeper" by determining "whether the reasoning or methodology underlying the testimony is . . . valid and whether that reasoning properly can be applied to the facts in issue." ***Daubert*** at 592-593. In ***Kumho Tire***, the Court extended the reach of ***Daubert's*** gatekeeping function to cover all types of expert testimony involving technical or otherwise specialized knowledge.

² Fed.R.Evid. 104 (a) states: *Preliminary questions concerning the qualification of a person to be a witness, the existence of privilege or the admissibility of evidence shall be determined by the court, subject to the provisions of subdivision (b). In making its determination it is not bound by the rules of evidence except those with respect to privileges.*

Kumho Tire Co. v. Carmichael, 526 U.S. 137, 141, 119 S.Ct. 1167, 143 L.Ed.2d 238 (1999). The Court's assessment of reliability is flexible, but "an expert must vouchsafe the reliability of the data on which he relies and explain how the cumulation of that data was consistent with standards of the expert's profession." **Zachar v. Lee**, 363 F.3d 70, 76 (1st Cir. 2004) quoting **SMS Sys. Maint. Servs., Inc. v. Digital Equip. Corp.**, 188 F.3d 11, 25 (1st Cir.1999).

A review of Mr. McKenna's Curriculum Vitae makes it abundantly clear that his professional experiences and education thoroughly qualify him to proffer the opinions detailed in his report. He is a registered professional engineer in the State of California and a member of several renowned engineering societies.³ See section entitled "Professional" of the Curriculum Vitae on page 10 of **Exhibit A** appended to the plaintiff's motion. During his professional career as a mechanical engineer, Mr. McKenna "designed, manufactured and sold a variety of advanced marine products and technical services including mooring systems and deck machinery" and spent time "producing winching machinery for ropes and cables for marine, utility

³ Member American Society of Mechanical Engineers (member B30-9 Committee; this body sets American national standards for lifting sling safety) and the Member Marine Technology Society.

and construction industries." {Underlining and italics our emphasis.] See section entitled "Industrial" of the Curriculum Vitae on page 10. Mr. McKenna's areas of "Expertise" include, in part, the following:

- Rope and cable applications for industrial, utility, construction, manufacturing and marine industries
- Offshore oil and maritime operations, especially towing, mooring and handling systems.
- System and machinery design.
- Management of mooring system design and research projects for the offshore oil industry.
- Ocean engineering
- Engineering documentation and quality assurance programs
- Machine design, particularly: winches, cable handling equipment, hoisting equipment, hydraulic drives & controls, gear drives.

His Curriculum Vitae also details his expert testimony over the past eight [8] years in the District of West Virginia, the District of Alaska and the New York State District Court in Utica, New York.

The defendants also note that Mr. McKenna successfully prepared and presented a Training Program to the Alaskan Marine Highway System [Ferry System] where he trained ferry deckhands on safe mooring line operations. See a copy of a letter to Mr. McKenna authored by the State of Alaska's Office of the Attorney General enclosed herein as **Exhibit 1**. His participation in the training program is also noted under the section entitled "Publications or Papers by

Author" of his Curriculum Vitae on page 6. Accordingly, this Honorable Court should find that Mr. McKenna's professional experiences and educational background thoroughly qualify him to proffer the opinions detailed within his report and his opinions should assist the jury in evaluating the plaintiff's allegations.

Since Mr. McKenna possesses considerable professional experience designing and manufacturing marine products, including winches similar to the winch at issue in this case, and consulting ferry operators on safety issues, the defendants dispute the plaintiff's claim that he has "no expertise in vessel docking operations or ferry operations in general." In designing and manufacturing marine products and equipment, specifically mooring equipment, an engineer must have a working familiarity with vessel operations, including proper docking maneuvers.

As detailed in his Curriculum Vitae, Mr. McKenna has designed winches and fendering systems, which are utilized to protect transfer bridges, such as the one at Slip No. 2 in Vineyard Haven. The defendants contend that Mr. McKenna's Eighth Opinion and Sixth Conclusion are sufficiently supported by his professional background and experience. Accordingly, his Eighth Opinion and Sixth

Conclusion will provide the jury with an understanding of the necessity and mechanics of the marine equipment involved in the alleged incident and therefore assist in the evaluation of the plaintiff's allegations.

Rule 702 of the Federal Rules of Civil Procedure sets forth the ground rules for consideration of expert testimony.⁴ It is fundamental that "[e]xpert testimony must be predicated on facts legally sufficient to provide a basis for the expert's opinion." **Damon v. Sun Co., Inc.** 87 F.3d 1467, 1474 (1st Cir. 1996) quoting **In re Salvatore**, 46 B.R. 247, 253 (Bankr.D.R.I.1984). "An expert should not be permitted to give an opinion that is based on conjecture or speculation from an insufficient evidentiary foundation." **Id.** quoting **Van Brode Group, Inc. v. Bowditch & Dewey**, 36 Mass.App.Ct. 509, 633 N.E.2d 424, 430 (1994).

Mr. McKenna's Third Opinion found on page 4 of his report states:

It is my opinion that the operator let go of the handle of the winch while the cable was under tension thus causing it to rotate backwards.

⁴ Rule 702 provides:
If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified***76** as an expert by knowledge, skill, experience, training or education may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods to the facts of the case.

A review of this opinion along with the other information contained in the report clearly illustrates that it is predicated on sufficient facts coupled with Mr. McKenna's expertise and background and therefore, it is one of his opinions as to the cause[s] of the plaintiff's accident.

Specifically, Mr. McKenna's Third Opinion should be reviewed in light of his Seventh Opinion found on page 5 of his report, which states, in part:

Lifting the end of the bridge would reduce the tension on the cable going to the winch which would, in turn, lessen the force on the handle. The operator would suddenly find it easier to rotate the handle. This is contradictory to the plaintiff's claim that the cable tightened.

Since the plaintiff contends that the defendant's vessel struck the transfer bridge at Slip No. 2 during its docking maneuvers with a force sufficient enough to cause the winch handle to recoil and strike him in the head, Mr. McKenna's opinions will assist the jury by illuminating the conditions necessary to support or refute the plaintiff's essential allegations. Accordingly, the defendants submit that Mr. McKenna's Third Opinion is essential to understanding the mechanics of the subject winch and its related equipment and will assist the jury in its evaluation of the plaintiff's allegations.

Mr. McKenna's First Opinion states:

It is my opinion that the winch was overloaded and required excessive force on the handle to lift the transfer bridge. Using data provided by References 1, 4 and 6, it is estimated that the operator may have been required to exert as much as 140lbs at the handle to lift the bridge. This placed the operator in an unsafe situation as it was difficult to control the winch handle.⁵

Mr. McKenna's First Conclusion states:

The winch was overloaded which made it very difficult to control the handle.

Mr. McKenna's report details the basis for his First Opinion and First Conclusion as predicated upon documents obtained through Keeper of Records Depositions of the Steamship Authority. Therefore, the plaintiff and his counsel have possessed these documents since they were produced to the parties by the Steamship Authority in 2006. The plaintiff has never objected to the sufficiency or reliability of these documents to date.

⁵ See page 5 of the report:

V. REFERENCES

1. Specifications for Wintech 5 ton winch Model HM 12
2. Parts, Operation and Maintenance Manual of Hand Winch Models, Form MHD56031, Edition 3, dated October 1996.
3. Memo from Mark Rozum, Director of Terminal Operations, Woods Hole, Martha's Vineyard and Nantucket Steamship Authority, dated November 23, 2004.
4. E-mail from Bill Clouter of the Steamship Authority to Phil Parent on 3/23/2005
5. Written statement of Rick McElhinney of the Steamship Authority, witness to the accident.
6. Drawing No. TW-012-1, "50 ft Transfer Bridge, by Fay, Stafford & Klondike, Inc. designers of the transfer bridge.

If the plaintiff sought to challenge Mr. McKenna's First Opinion and First Conclusion, either he or an expert retained by him, could have reviewed the same materials referenced by Mr. McKenna and proffered their own opinions concerning the winch's weight limitations. Alternatively, plaintiff's counsel could have requested a copy of Mr. McKenna's calculations from defense counsel as permitted under Fed.R.Civ.P. 26(e)(1).⁶ Mr. McKenna's reference to and reliance upon the documents produced by the Steamship Authority provide a sufficient factual basis to support his First Opinion and First Conclusion. They are not mere conclusions evidencing a "bottom line." The Steamship Authority documentation coupled with Mr. McKenna's expertise and background provide a sufficient foundation for the reliability and admissibility of his first Opinion and first Conclusion. Accordingly, the defendants submit that Mr. McKenna's First Opinion and First Conclusion are essential to understanding the weight limitations of the subject winch and will assist the jury in its evaluation of the plaintiff's allegations.

⁶ A party is under a duty to supplement at appropriate intervals its disclosures under subdivision (a) if the [defendant] learns that in some material respect the information disclosed is incomplete or incorrect and if the additional or corrective information has not otherwise been made known to the other parties during the discovery process or in writing.

The Steamship Authority's documentation referenced by Mr. McKenna, his inspection of the subject winch in November 2006 and his professional expertise provide a sufficient factual foundation for his Fourth Opinion and Second Conclusion.

Mr. McKenna's Fourth Opinion states:

The operator was in an unsafe position by facing the winch handle with the winch to the side. There is considerable risk of injury if the handle should be released. The safer position is facing the end of the winch with the handle in front of the operator so that backward rotation would not strike the body or head.

Mr. McKenna's Second Conclusion states:

The operator was standing in an unsafe location in violation of procedures when a less dangerous position was present.

Mr. McKenna's report refers to the Parts, Operation and Maintenance Manual of Hand Winch Models, Form MHD56031, Edition 3, dated October 1996. See Reference No. 2.⁷ Again, this document was produced to the parties in response to a Keeper of Records Deposition of the Steamship Authority. On page 7 of Reference No. 2, the section entitled, "**Paying Out or Hauling In with Handle**" states, in part:

⁷ Mr. McKenna also references this section of the winch manual on page 2 of his report.

When facing the gear and handle side of the winch
(underlining our emphasis):

1. Rotate the handle (34) clockwise to rotate the drum counterclockwise.
2. Rotate the handle (34) counterclockwise to rotate the drum clockwise.

A copy of page 7 of the Parts, Operation and Maintenance Manual of Hand Winch Models is enclosed herewith as **Exhibit No. 2**.

The winch manual clearly states that an operator should face the gear and handle side of the winch while cranking the handle. Mr. McKenna reviewed the manual along with other materials produced by the Steamship Authority and the plaintiff's deposition transcript, in which the plaintiff testified that he was standing behind the winch handle before he was struck in the head. During the inspection of the subject winch in November 2006, Mr. McKenna personally observed Steamship Authority employees turning winch handles from a side position. See photographs on page 2 of **Exhibit A** appended to the plaintiff's motion. Therefore, a thorough factual basis exists in support of Mr. McKenna's Fourth Opinion and Second Conclusion. Accordingly, the defendants submit that Mr. McKenna's Fourth Opinion and Second Conclusion are essential to understanding the proper and safe operation of the subject winch and will assist the jury in its evaluation of the plaintiff's allegations.

Federal Rule of Evidence 402 states, in part, that evidence which is not relevant is not admissible. Federal Rule of Evidence 403 requires that relevant evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury. See *Gomez v. Rivera Rodriguez*, 344 F.3d 103, 115 (1st Cir. 2003); *Kassel v. Gannett Co., Inc.*, 875 F.2d 935, 952 (1st Cir. 1989). Presumably, if the Steamship Authority knew or should know of the availability of equipment that would have prevented the backward rotation of the winch, the jury could reasonably find it comparatively negligent for the plaintiff's accident.

The assessment of the Steamship Authority's comparative fault for the plaintiff's accident is essential to the fair and just determination of the plaintiff's allegations. As the plaintiff's employer, the Steamship Authority was responsible to provide equipment, which was free of defects and fit for its intended purpose. Mr. McKenna's Sixth Opinion and Fourth Conclusion speak directly to readily available equipment, which, in his opinion, would have prevented the plaintiff's accident.

Mr. McKenna's Sixth Opinion states:

It is my opinion that a winch with a load operated brake that would have prevented backward rotation

should have been used. This would have prevented the accident.

Mr. McKenna's Fourth Conclusion states:

A winch with a load operated brake should have been used.

A review of page 8 of the winch manual details it as an (optional feature), but it is available to purchasers of the winch. In addition, the winch brochure detailed on page 8 of Mr. McKenna's report clearly states in bold and offset type:

Optional disc brake handle incorporates a "Weston" style load brake to automatically hold the rated load in lifting applications.

The aforementioned documentation provides a thorough factual basis to support Mr. McKenna's Sixth Opinion and Fourth Conclusion. Any assessment by the jury concerning the availability of load disc brake assemblies for the subject winch only clarifies the potential causes of the plaintiff's accident. Mr. McKenna's opinions are not the ultimate determination on the issue of causation, but simply a variable for the jury to consider in its liability evaluation. The plaintiff's case is not unfairly prejudiced if the defendants can show all potential causes of his accident. Accordingly, Mr. McKenna's Sixth Opinion and Fourth Conclusion are essential to understanding available,

albeit optional, safety equipment for the subject winch and will assist the jury in its evaluation of the plaintiff's allegations and the comparative fault of all involved parties, including his employer, The Steamship Authority.

CONCLUSION

WHEREFORE, the defendants pray that this Honorable Court, for the reasons stated herein, deny plaintiff's Motion to Strike Certain Opinions of Henry A. McKenna, P.E. and permit the defendants the opportunity to offer his report, in its entirety, in support of their defenses.

Respectfully Submitted,
By their attorneys,
CLINTON & MUZYKA, P.C.,

"/s/ Terence G. Kenneally"
Thomas J. Muzyka
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617-723-9165

Dated: June 6, 2007

EXHIBIT 1

STATE OF ALASKA
DEPARTMENT OF LAW
OFFICE OF THE ATTORNEY GENERAL

TONY KNOWLES, GOVERNOR

P.O. BOX 110300
DIMOND COURT HOUSE, 6TH FLOOR
JUNEAU, ALASKA 99811-0300
PHONE: (907)465-3600
FAX: (907)465-6735

June 29, 2001

Henry McKenna
Tension Technology International, Inc
35 Hubbard Road
Weston, Massachusetts 02493

Dear Hank:

A couple of weeks ago I sat down with Jeff Hurst to review the video tapes of your rope handling presentation to deckhands employed by the Alaska Marine Highway System. I was really impressed with the professional manner of your presentation. It was obvious the employees were very interested in the subject by the nature of their questions. Great background handout material!!

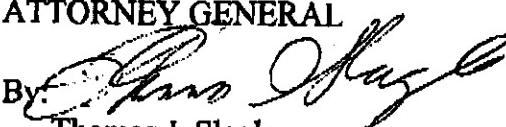
If the presentation helps avoid one accident, the huge effort is worthwhile. I especially enjoyed the give and take between you and Jeff Hurst. I'm sure the video tape will be a good learning and safety tool for the present and future AMHS employees.

Thanks a lot Hank. Your efforts are appreciated.

Sincerely,

BRUCE M. BOTELHO
ATTORNEY GENERAL

By:


Thomas J. Slagle
Assistant Attorney General

TJS/jad
cc: Jeff Hurst, Safety Officer, AHMS
Brad Thompson, Director, Risk Mgmt.

EXHIBIT 2

PARTS, OPERATION AND MAINTENANCE MANUAL for HAND WINCH MODELS

LM6/LM6W

2 TON

LM10/LM10W

2 TON

LM16/LM16W

2 TON

HM8/HM8W

5 TON

HM12/HM12W

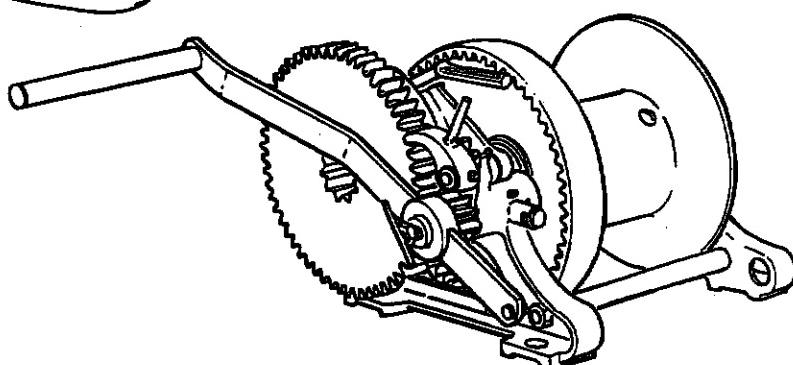
5 TON

HM16/HM16W

5 TON

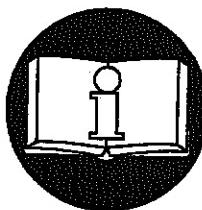
HM24/HM24W

5 TON



Note: "W" denotes handwheel

1 Ton = 2000 lbs



READ THIS MANUAL BEFORE USING THESE PRODUCTS. This manual contains important safety, installation, operation and maintenance information. Make this manual available to all persons responsible for the operation, installation and maintenance of these products.

A WARNING

Do not use this winch for lifting, supporting, or transporting people or lifting or supporting loads over people.

Always operate, inspect and maintain this winch in accordance with American National Standards Institute Safety Code (ANSI B30.7) and any other applicable safety codes and regulations.

Refer all communications to TSE International Inc. or your nearest Distributor.

Form MHD56031

Edition 3

October 1996

71057400

© 1996 TSE International Inc.



SAFETY INFORMATION

This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read and understand this manual before operating the product.

Danger, Warning, Caution and Notice
Throughout this manual there are steps and procedures which, if not followed, may result in a hazard. The following signal words are used to identify the level of potential hazard.

DANGER

Danger is used to indicate the presence of a hazard which *will* cause *severe* injury, death, or substantial property damage if the warning is ignored.

WARNING

Warning is used to indicate the presence of a hazard which *can* cause *severe* injury, death, or substantial property damage if the warning is ignored.

CAUTION

Caution is used to indicate the presence of a hazard which *will or can* cause *minor* injury or property damage if the warning is ignored.

NOTICE

Notice is used to notify people of installation, operation, or maintenance information which is important but not hazard-related.

Safety Summary**WARNING**

- Do not use this winch for lifting, supporting, or transporting people or lifting or supporting loads over people.
- The supporting structures and load-attaching devices used in conjunction with this winch must provide an adequate safety factor to handle the rated load, plus the weight of the winch and attached equipment. This is the customer's responsibility. If in doubt, consult a registered structural engineer.

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point: Employees who work near cranes or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out from under a raised load and keep out of the line of force of any load.

TSE International Material Handling winches are manufactured in accordance with the latest ASME B30.7 standards.

The Occupational Safety and Health Act of 1970 generally places the burden of compliance with the owner/employer, not the manufacturer. Many OSHA requirements are not concerned or connected with the manufactured product but are, rather, connected with the final installation. It is the owner's responsibility and user's responsibility to determine the suitability of a product for any particular use. It is recommended that all applicable industry, trade association, federal, state and local regulations be checked. Read all operating instructions and warnings before operation.

Rigging: It is the responsibility of the operator to exercise caution, use common sense and be familiar with proper rigging techniques. See ANSI/ASME B30.9 for rigging information, American National Standards Institute, 1430 Broadway, New York, NY 10018.

This manual has been produced by TSE International to provide dealers, mechanics, operators and company personnel with the information required to install, operate, maintain and repair the products described herein. It is extremely important that mechanics and operators be familiar with the servicing procedures of these products, or like or similar products, and are physically capable of conducting the procedures. These personnel shall have a general working knowledge that includes:

1. Proper and safe use and application of mechanics common hand tools as well as special TSE International or recommended tools.
2. Safety procedures, precautions and work habits established by accepted industry standards.

TSE International can not know of, nor provide all the procedures by which product operations or repairs may be conducted and the hazards and/or results of each method. If operation or maintenance procedures not specifically recommended by the manufacturer are conducted, it must be ensured that product safety is not endangered by the actions taken. If unsure of an operation or maintenance procedure or step, personnel should place the product in a safe condition and contact supervisors and/or the factory for technical assistance.

SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions have been adapted in part from American National (Safety) Standard ANSI B30.7 and are intended to avoid unsafe operating practices which might lead to personal injury or property damage.

TSE International recognizes that most companies who use winches have a safety program in force. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

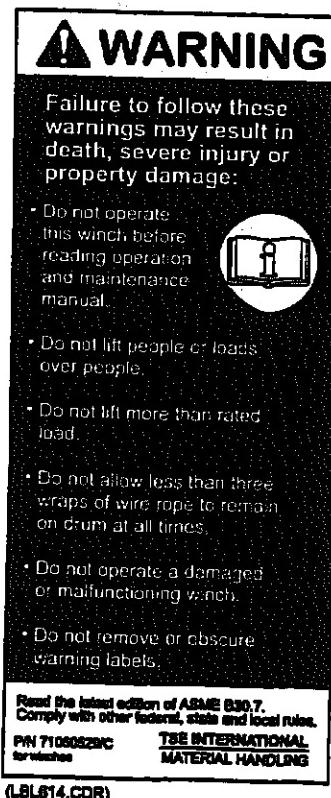
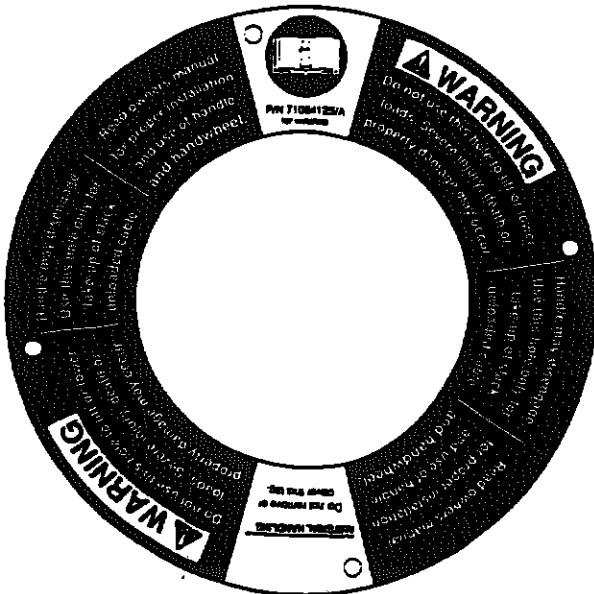
Safe Operating Instructions are provided to make an operator aware of dangerous practices to avoid and are not necessarily limited to the following list. Refer to specific sections in the manual for additional safety information.

1. Only allow personnel instructed in safety and operation of this winch to operate and maintain the winch.
 2. Only operate a winch if you are physically fit to do so.
 3. When a "DO NOT OPERATE" sign is placed on the winch, do not operate the winch until the sign has been removed by designated personnel.
 4. Before each shift, check the winch for wear and damage. Never use a winch that inspection indicates is worn or damaged.

5. Never lift a load greater than the rated capacity of the winch. See warning labels and tags attached to winch.
 6. Keep hands, clothing, etc., clear of moving parts.
 7. Never place your hand in the throat area of a hook or near wire rope spooling onto or off of the winch drum.
 8. Always rig loads properly and carefully.
 9. Be certain the load is properly seated in the saddle of the hook. Do not tipload the hook as this leads to spreading and eventual failure of the hook.
 10. Do not "side pull" or "yard".
 11. Make sure everyone is clear of the load path. Do not lift a load over people.
 12. Never use the winch for lifting or lowering people, and never allow anyone to stand on a suspended load.
 13. Ease the slack out of the wire rope when taking-up wire rope. Do not jerk the load.
 14. Do not swing a suspended load.
 15. Never suspend a load for an extended period of time.
 16. Never leave a suspended load unattended.
 17. Pay attention to the load at all times when operating the winch.
 18. After use, properly secure winch and all loads.
 19. The operator must maintain an unobstructed view of the load at all times.
 20. Never use the wire rope as a sling.

WARNING LABELS AND TAGS

Each winch is supplied from the factory with the warning tag and label shown. If the tag or label is not attached to your unit, order a new tag or label and install it. Refer to the parts list for the part number. Read and obey all warnings and other safety information attached to this winch. Warning tag and label may not be shown actual size.



SPECIFICATIONS

Table 1

Model No.	Capacity 1st Layer US Tons	Gear Ratio**	Full Drum Capacities (ft)						Net Weight*	
			1/4 in	5/16 in	3/8 in	7/16 in	1/2 in	5/8 in	lbs	kg
LM6/LM6W	2	4:1/22:1	285	203	114	106	68	---	60	27
LM10/LM10W			483	346	195	182	118	---	70	32
LM16/LM16W			780	561	316	296	192	---	83	38
HM8/HM8W	5	4:1/24:1	---	---	394	314	230	124	110	50
HM12/HM12W			---	---	601	480	352	191	138	62
HM16/HM16W			---	---	807	645	474	258	150	68
HM24/HM24W			---	---	1221	977	719	392	175	79

* Winch without wire rope

** The 4:1 gear ratio is for fast take-up of slack unloaded line only. The 22:1 and 24:1 gear ratio is for lifting or pulling loads.

Wire rope capacities are calculated for full drum storage and may vary from figures printed elsewhere.
(TBLSPECs)

Model Code Explanation

Model Code Example

LM6W-GC-M

Series

LM = 2 US Ton 4,000 lb. (1815 kg) Hand Winch
 HM = 5 US Ton 10,000 lb. (4536 kg) Hand Winch

Drum Length (measured between drum flanges)

6 = 6 in (152 mm)
 10 = 10 in (254 mm)

Handwheel

W = With Handwheel
 - = Without Handwheel

Gear Cover

GC = With Gear Cover
 - = Without Gear Cover

Options

M = Marine 812 top coat
 RD = Reverse Dog
 SBH = Disc Brake Handle. Must not be used with handwheel winches
 SD = Drum Divider Flange*

* Not covered in this manual. For additional information contact TSE International Inc.

INSTALLATION

Prior to installing the winch, carefully inspect it for possible shipping damage.

CAUTION

- Owners and users are advised to examine specific, local or other regulations, including American National Standards Institute and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting winch to use.

Mounting

1. If product is to be mounted in one position be sure the mounting surface is even and of sufficient strength to handle the rated load and prevent possible binding of the winch.
2. Make sure the winch is positioned so handle or optional handwheel can rotate a full 360 degrees unobstructed. Reposition winch if necessary.
3. Make sure the mounting surface is flat to within 1/16 in. (2 mm). Shim if necessary.
4. Mounting bolts must be 9/16 in. (14 mm) for LM models and 5/8 in. (16 mm) for HM models and must be Grade 5 or better. Use self-locking nuts or nuts with lockwashers. Refer to Table 2 and Dwg. MHTPA0124 for bolt pattern dimensions.
5. Tighten mounting bolts evenly and torque to:

Size	Dry	Lubricated
9/16 in	115 ft lbs (155 Nm)	105 ft lbs (142 Nm)
5/8 in	160 ft lbs (215 Nm)	145 ft lbs (196 Nm)
6. Maintain a fleet angle between the sheave and winch of no more than 1-1/2 degrees. For every inch (25 mm) of drum length, the lead sheave must be at least 1.6 feet (0.5 m) from the drum.
7. Do not weld to any part of the winch.

Wire Rope Selection

Consult a reputable wire rope manufacturer or distributor for assistance in selecting the appropriate type and size of wire rope and, where necessary, a protective coating. Use a wire rope which provides an adequate safety factor to

handle the actual working load and meets all applicable industry, trade association, federal, state and local regulations.

When considering wire rope requirements the actual working load must include not only the static or dead load but also loads resulting from acceleration, retardation and shock load. Consideration must also be given to the size of the winch wire rope drum, sheaves and method of reeving. Refer to Table 3 for minimum and maximum wire rope diameters. The maximum diameter of the wire rope is limited by the size of the wire rope anchor.

Table 3

Model No.	Wire Rope Diameter			
	Minimum		Maximum	
	in.	mm	in.	mm
LM6/LM6W				
LM10/LM10W	1/4	6.4	1/2	12.7
LM16/LM16W				
HM8/HM8W				
HM12/HM12W	3/8	9.5	5/8	15.9
HM16/HM16W				
HM24/HM24W				

(TBL.WIREROPE)

WARNING

- Check wire rope diameter provides an adequate safety factor.

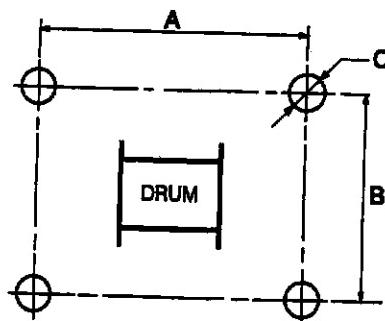
Installing Wire Rope

(Ref. Dwg. MHTPA0120)

CAUTION

- Position the wire rope so that it comes off the top of the drum for overwind operation.

1. Cut wire rope to length and fuse end to prevent fraying of strands in accordance with the wire rope manufacturer's instructions.

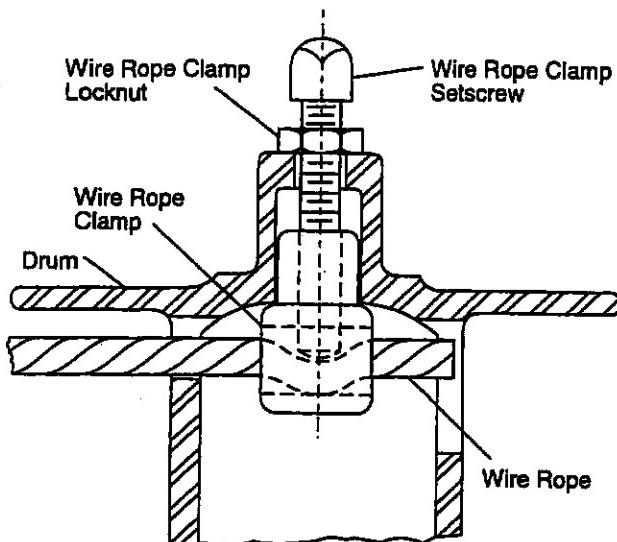


(Dwg. MHTPA0124)

Table 2

Model No.	Bolt Pattern Dimensions					
	"A"		"B"		"C"	
	in	mm	in	mm	in	mm
LM6/LM6W	10-3/4	27.3				
LM10/LM10W	14-5/8	37.5	7-9/16	19.2	5/8	15.9
LM16/LM16W	20-5/8	52.4				
HM8/HM8W	13-7/8	35.1				
HM12/HM12W	17-3/4	45.0				
HM16/HM16W	22-1/4	56.5	10-3/16	25.9	11/16	28.6
HM24/HM24W	30-1/4	77.5				

(TBL.BOLTPATT)



(Dwg. MHTPA0120)

2. Feed the fused end of the wire rope into the wire rope anchor hole in the drum and through the hole in the wire rope clamp (23) until the wire rope end extends to the inside wall of the drum.
3. Tighten wire rope clamp setscrew (28) and locknut (29).

Safe Wire Rope Handling Procedures

1. Always use gloves when handling wire rope.
2. Never use wire rope which is frayed or kinked.
3. Never use wire rope as a sling.
4. Always ensure wire rope is correctly spooled and first layer is tight.

Wire Rope Spooling

To allow for uneven spooling and decrease in line pull capacity as the drum fills up, use as short a wire rope as practical. Always maintain three or more wraps of wire rope on the drum. When rewinding wire rope apply tension to eliminate slack. This helps achieve level winding and tight spooling.

Rigging

Make sure all wire rope blocks, tackle and fastenings have sufficient safety margin to handle the required load. Do not allow wire rope to contact sharp edges or make sharp bends which will cause damage to wire rope, use a sheave. Refer to wire rope manufacturer's handbook for proper sizing, use and care of wire rope.

Power Driven Winches (optional feature)

The LM and HM winches may be operated with a power drive attachment. Power conversion pinions for different drive methods are shown in the parts section. This method of operating the winch is *only* intended for the purpose of rapidly taking up wire rope without load. When operating the winch with a power drive attachment care must be taken to ensure gears and bearings are properly lubricated.

WARNING

- Do not exceed the maximum speed and torque stated in Table 4. Excessive speed or torque will result in premature winch failure.
- Do not use a power drive pinion when a Load Disc Brake is installed. Always remove the Load Disc Brake before using power drive option.

Table 4

Model No.	Power Drive Motor Information	
	Maximum Motor RPM	Maximum Motor Torque
LM6/LM6W		
LM10/LM10W	120	364 in. lb (4.2 kg.m)
LM16/LM16W		
HM8/HM8W		
HM12/HM12W		
HM16/HM16W	120	1312 in. lb (15.1 kg.m)
HM24/HM24W		

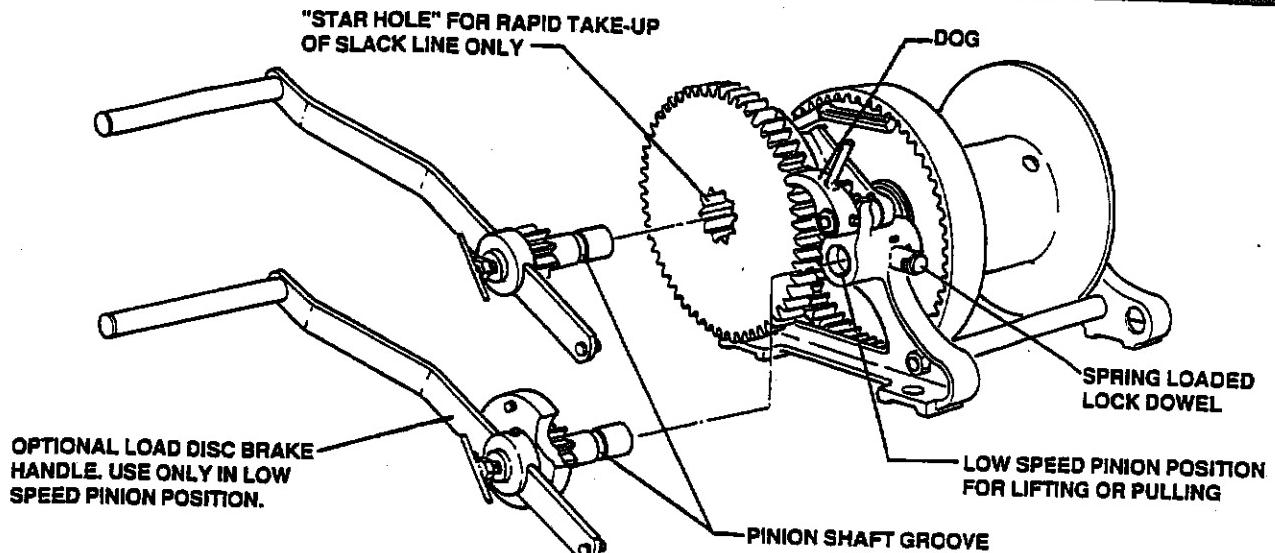
(TBL.POWER)

WARNING

- Always ensure power drive pinion is fully engaged in the large gear (12) "star hole".
- Power drive pinions are only intended for fast wire rope take-up with no load and must never be used to power the winch with a load.

Safe Installation Procedures

1. Do not use wire rope as a ground for welding.
2. Do not attach a welding electrode to winch or wire rope.
3. Never run the wire rope over a sharp edge. Use a correctly sized sheave.
4. When a lead sheave is used, it must be aligned with the center of the drum as described in the "Mounting" instructions. The diameter of the lead sheave must be at least 18 times the diameter of the wire rope.
5. Always maintain at least three full wraps of wire rope on the drum.

OPERATION

(Dwg. MHTPA0123)

- The four most important aspects of winch operation are:
1. Follow all safety instructions when operating the winch.
 2. Allow only people instructed in the operation of the winch to operate the winch.
 3. Subject each winch to a regular inspection and maintenance procedure.
 4. Be aware of the winch capacity and weight of load at all times.

WARNING

- This winch is not designed or suitable for lifting, lowering or moving persons. Never lift loads over people.
- Always maintain at least three full wraps of wire rope on the drum at all times.

Handle Attachment

(Ref. Dwg. MHTPA0125)

Insert handle (34) through the slot in pinion (33) and clamp in required position with locking screw (35). Handle length is adjustable. Install handle retainer (32) and locknut (31) in the hole provided at the end of handle (34) arm. Pinion (33) is retained by the spring loaded lock dowel (30) when the pinion is installed in the low speed position.

Operation

When lifting or pulling always:

1. Operate with handle in low speed pinion position.
2. Ensure spring loaded lock dowel is engaged in the pinion shaft groove. Check that spring loaded lock dowel is engaged by pulling on handle.
3. Engage dog before moving load.

4. For releasing or lowering load make sure handle is in low speed gear and locked in. Crank load up so that dog is free for release. If it is difficult to crank the load up to release the dog the winch may be overloaded and the load must be reduced before attempting to lower. Maintain a firm grip on handle with one hand and disengage dog with the other. Release or lower load slowly with two hands on crank. An alternate load release method is to drag brake with one hand and crank handle with the other after dog is disengaged.

Handle Position	Gear Ratio	Operating Condition
Low Speed Pinion	22:1 (LM) 24:1 (HM)	Take-up or payout of loaded or slack wire rope.
"Star Hole" in Gear	4:1	Take-up or payout of slack wire rope only.

(TBL.HANDLE)

Paying Out or Hauling In with Handle

When facing the gear and handle side of the winch:

1. Rotate the handle (34) clockwise to rotate the drum counterclockwise.
2. Rotate the handle (34) counterclockwise to rotate the drum clockwise.

To avoid "birdnesting" caused by slack wire rope, apply tension to the wire rope when spooling onto the drum.

To Let Out Unloaded Wire Rope (Free-Spool Condition)

! WARNING

- To avoid injury and damage to equipment due to a falling load, disconnect the load before activating free-spool condition.

1. Make sure there is no load on the winch.
2. Remove handle (34).
3. Releasing the dog (24) and brake lever (13) will allow the drum to rotate.
4. Pull end of wire rope to desired location.
5. When sufficient wire rope has been pulled from the drum re-apply the dog (24).

! WARNING

- A creeping load can cause death or injury. Do not rely on the hand brake to hold a suspended load.
- Do not overload winch.

Installing a 28 in. Handwheel (optional feature)

1. Install retaining ring (39) on shaft (38).
2. Install shaft (38) into handwheel pinion (36).
3. Place bushing (37) on the end of shaft (38) and install roll pin (40) through shaft (38).
4. Use handwheel lock assembly on threaded stud in the end of the cluster shaft or in the "large gear" only. For normal operation (winching) the handwheel is retained by the spring loaded lock dowel (30), when installed in the low-speed pinion position.

! WARNING

- Never attempt to raise or lower a load with the handwheel inserted in the "star hole" at the center of the gear. This position is for rapid take-up of slack line only.
- Before lifting, lowering or moving a load always make sure that the spring loaded lock dowel (30) is locked in by pulling on the handle.
- Never release the spring loaded lock dowel (30) when holding a load.

! CAUTION

- Use extreme caution when using the handwheel for rapid take-up of slack wire rope with pinion inserted in the gear "star hole". Never use the handwheel in the "star hole" on gear (12) without a threaded stud in the "star hole" to secure the handwheel.

Load Disc Brake Assembly (optional feature) (Ref. Dwg. MHTPA0256)

! WARNING

- Never use the load disc brake assembly in the "star hole" in the center of the cluster gear (rapid wire rope take-up position). This position is for slack line take-up only.

1. The load disc brake assembly will install in place of the standard winch turning handle. When installed it will not permit the winch to freewheel for rapid wire rope take-up or pay-out.
2. When the load disc brake assembly has been installed into the regular low speed pinion position align the anchor bracket link (126) with the spacer (27) on the winch large frame (3). To ensure correct load brake operation the anchor bracket link (126) must be in a vertical position when installed.
3. Once aligned screw the anchor bar (121) onto the end of spacer (27) and turn clockwise until it is tight. Once tightened, place the cotter pin (123) through the anchor bar (121) to secure the load disc brake assembly.
4. Check that the load disc brake assembly is fully locked in place by the spring loaded lock dowel (30). Check that spring loaded lock dowel is engaged by pulling on handle.
5. To adjust handle length loosen lockscrew (35), set handle (34) to required position then tighten lockscrew (35).
6. To take-up wire rope rotate handle in a clockwise direction. This causes the actuating screw (107) to clamp the friction discs (105) against the ratchet wheel (106). Continued turning of the handle will disengage the ratchet dog (113) and allow the ratchet wheel (106) to turn. An audible clicking will be noticed as each tooth on the ratchet wheel rotates past the ratchet dog and the spring (112) causes the dog to engage the next tooth.
7. To payout wire rope rotate handle in a counterclockwise direction. This will rotate the actuating screw (107) to release the friction discs (105) from the ratchet wheel (106) which is held stationary by the ratchet dog (113). When handle rotation ceases tension on the wire rope will tighten the actuating screw to clamp the friction discs and hold the load.

NOTICE

- The load disc brake assembly requires no adjustment.

Power Driven Winches (optional feature)

When using a power drive pinion it must only be installed in the large gear (12) "star hole". The power drive pinion is only to be used for rapid take-up of unloaded wire rope. Refer to the "INSTALLATION" section for maximum allowable operating input speed and torque.

INSPECTION

There are two types of inspection, the frequent inspection performed by the operator and more thorough periodic inspections performed by qualified personnel. Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.

Any deficiency revealed through inspection must be reported to an appointed person. A determination must be made as to whether a deficiency constitutes a safety hazard before resuming operation of the winch.

Records and Reports

Some form of inspection record should be maintained for each winch, listing all points requiring periodic inspection. A written report should be made monthly on the condition of the critical parts of each winch. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available to authorized personnel.

Frequent Inspection

On winches in continuous service, frequent inspection should be made at the beginning of each shift. In addition, visual observations should be conducted during regular service for any damage or evidence of malfunction.

1. **OPERATION.** To make sure the drive mechanism operates properly, check for sticking or other signs of malfunction. Repair if necessary. Test brake operation by lifting a load 1 to 2 in. (25 to 50 mm) off the floor and check that the brake holds the load.
2. **LIMIT DEVICES.** If used, check that they operate properly.
3. **WIRE ROPE.** Lubricate if necessary. Replace the wire rope if damaged or excessively worn. Consult the wire rope manufacturer's inspection information or a recognized safety source, such as the latest edition of National Safety Council, Accident Prevention Manual for Industrial Operations or ASME B30.7. The following list is a users guide to the accepted standards by which wire rope must be judged and is not presented as a substitute for an experienced inspector.
 - a. Damage, such as: bird cages, kinking, core protrusion, crushing, heat damage, and main strand displacement.
 - b. Corrosion and nicking.
 - c. Wear of crown wires. Replace at 1/3 wear of the original diameter of any crown wire.
 - d. Broken wires or strands, particularly at connections. Replacement is necessary if one wire is broken at a connection; six broken wires within one lay; three broken wires in one strand within one lay.

4. **WIRE ROPE REEVING.** Check reeving and ensure wire rope is properly secured to the drum. Make sure the wire rope anchor screw is tight and check for signs of slippage of the wire rope end. If slippage is evident, reinstall wire rope per installation procedure.

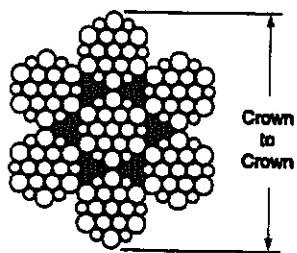
Periodic Inspection

According to ASME B30.7, frequency of periodic inspection depends on the severity of usage: **NORMAL**, yearly; **HEAVY**, semi-annually; **SEVERE**, quarterly. Disassembly may be required for **HEAVY** or **SEVERE** usage. Keep accumulative records of periodic inspections to provide a basis for continuing evaluation.

Inspect all items in "Frequent Inspection" also inspect the following:

1. **MEMBERS.** Check for deformed, cracked or corroded main components. Replace damaged parts if necessary.
2. **FASTENERS.** Check rivets, cotter pins, capscrews and nuts on winch, including mounting bolts. Replace if missing and tighten if loose.
3. **DRUM.** Check for cracks, wear or damage. Replace or repair if necessary.
4. **ALL COMPONENTS.** Inspect for wear, damage, distortion and cleanliness. If external evidence indicates the need, for example poor performance or excessive noise, disassemble and inspect. Check pins, gears, shafts, bushings, sheaves, covers, etc. Replace worn or damaged parts.
5. **BRAKE.** Check the thickness of the brake shoe lining. Replace the brake shoe if lining is less than .062 in. (2 mm) thick anywhere along its edge. Check adjustment of adjusting setscrew (11). (Ref. Dwg. MHTPA0127).
6. **SUPPORTING STRUCTURE.** Check for distortion, wear and continued ability to support the winch and load.
7. **LABELS AND TAGS.** Check for presence and legibility. Replace if necessary.
8. **WIRE ROPE.** Besides the items in a frequent inspection, inspect the following:
 - a. Build-up of dirt and corrosion. Clean if necessary.
 - b. Loose or damaged end connection. Replace if loose or damaged.
 - c. Check wire rope anchor is secure.
 - d. Changes in the size of the wire rope diameter. Periodically measure the diameter of the wire rope from crown-to-crown throughout the life of the wire rope. The actual diameter should be recorded when the wire rope is under equivalent loading and in the same operating section. If the actual diameter of the wire rope has decreased more than 1/64 in. (0.4 mm) a thorough

examination of the wire rope should be conducted by an experienced inspector to determine the suitability of the wire rope to remain in service.
(Ref. Dwg.MHTPA0056).



(Dwg. MHTPA0056)

⚠ WARNING

- Never use a winch that inspection indicates is defective.

Winches Not in Regular Use

A winch which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming with the requirements of "Frequent Inspection" before being placed into service.

A winch which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection".

Standby winches shall be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". If abnormal operating conditions apply winches may require a more frequent inspection.

Testing

Operational Tests

Prior to initial use, all new, altered or repaired winches shall be tested to ensure proper operation.

1. Operate winch in both directions with no load.
2. Check operation of brakes and pawls.
3. Check operation of limit switches, and locking or safety devices when provided.
4. Check all tie-downs are secure.

Rated Load Test

Prior to initial use, all new, extensively repaired, or altered winches shall be tested by or under the direction of a qualified person, and a written report furnished confirming the rating of the winch. Test loads shall not be more than 110% of the rated line pull.

LUBRICATION

⚠ CAUTION

- Lubricate the winch regularly using only the recommended grease.

Gears

If winch is disassembled, clean all parts thoroughly and coat gears with clean grease. Lubricate working surfaces of all gear teeth. Brush with grease as often as necessary to keep the teeth liberally covered. If the grease becomes contaminated with sand, dirt or other abrasive materials clean off old grease and relubricate. For temperatures -20° to 50° F (-29° to 10° C) use a multipurpose lithium-based EP 1 grease. For temperatures 30° to 120° F (-1° to 49° C) use a multipurpose lithium-based EP 2 grease.

Pivot Points and Bushings

Lubricate the five grease fittings (9) monthly with 2 or 3 pumps from a grease gun or more frequently, depending on severity of service. Rotate drum and gearing slowly as grease is being applied. Use the same grease recommended for the gears. Refer to the parts drawing MHTPA0125 for grease fitting locations.

Wire Rope

Follow the wire rope manufacturer's instructions. At a minimum, observe the following guidelines.

⚠ CAUTION

- Do not use an acid-based solvent. Only use cleaning fluids specified by the wire rope manufacturer.
1. If there is dirt, rock dust or other foreign material on the surface of the wire rope, clean with a brush or steam.
 2. Apply a wire rope lubricant, or SAE 30 W oil.
 3. Brush, drip or spray lubricant weekly, or more frequently, depending on severity of service.

MAINTENANCE

WARNING

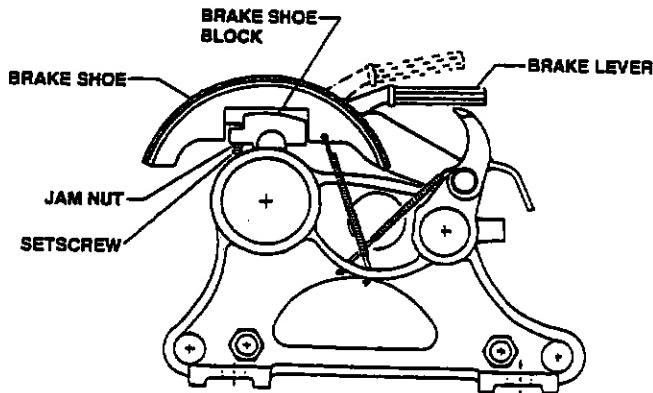
- Never perform maintenance on the winch while it is supporting a load.
- Before performing maintenance, tag winch:
DANGER - DO NOT OPERATE - EQUIPMENT BEING REPAIRED.
- Only allow service personnel trained in service and repair to perform maintenance.
- After performing any maintenance on the winch, test winch to 110% of its rated capacity before returning to service.

Make sure that all parts are in place and operating correctly. Replace worn or missing parts with genuine TSE International factory replacement parts.

Drum Brake

Adjustment (Ref. Dwg. MHTPA0127)

1. Remove gear (12) and brake drum.
2. Loosen jam nut (10) and adjustment setscrew (11).
3. Tighten adjustment setscrew (11) to increase brake torque.



(Dwg. MHTPA0127)

4. Lock adjustment setscrew (11) with jam nut (10).
5. Replace gear (12) and brake drum.
6. Brake is adjusted properly when drum is locked with brake lever (13) approximately 1-1/2 in. (37 mm) away from the stop. Drum should turn freely when lever is against stop.

CAUTION

- Brake shoe (15) should be replaced if lining is less than 0.062 in. (2 mm) thick anywhere along its length.

General Disassembly

The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the winch. Assembly drawings of the winch are provided in the Parts Section to assist part identification. If a winch is being completely disassembled for any reason, follow the order of the topics as they are presented. It is recommended that all maintenance work on the winch be performed on a sturdy work bench. In the process of disassembling the winch, observe the following:

1. Never disassemble the winch any further than is necessary to accomplish the needed repair. A good part can be damaged during the course of disassembly.
2. Never use excessive force when removing parts. Tapping gently around the perimeter of a part with a soft hammer should be sufficient to loosen the part.
3. Do not heat a part with a flame to free it for removal, unless the part being heated is already worn or damaged beyond repair and no additional damage will occur to other parts.
- In general, the winch is designed to permit easy disassembly and assembly. The use of heat or excessive force should not be required.
4. When grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and shafts.
5. Do not remove any part which is press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.

Winch Disassembly

1. Remove the wire rope from the drum (18).
2. Remove the winch from its mounting and set in a clean work area on a sturdy work bench.
3. Pull back on the spring loaded lock dowel (30) to remove the handle (34) and pinion (33) assembly.
4. Remove cotter pin (6) and dowel (5) from the top of the large frame (3).
5. Pull the gear (12) from the large frame (3).
6. Remove nuts (1) from spacers (27) and slide small frame (19) from the drum (18). Remove spacers (27).
7. Remove the drum (18) from large frame (3).
8. Remove cotter pin (21) from dog pin (22). Remove dog spring (26) from dog (24).
9. Carefully tap dog pin (22) from the large frame (3) and remove dog (24).
10. Unhook spring (17) and remove brake shoe (15), brake shoe block (14) and brake lever (13).
11. Press out bushings (2), (4) or (16) only if they are to be replaced.

Cleaning, Inspection and Repair

Use the following procedures to clean, inspect, and repair the components of the winch.

Cleaning

! CAUTION

- Bushings that are loose, worn or rotate in the frame must be replaced. Failure to observe this precaution will result in additional component damage.**

Clean all winch component parts in solvent (except for the brake shoe). The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments on the gears, frames and drum. If bushings have been removed it may be necessary to carefully scrape old Loctite from the bushing bores. Dry each part using low pressure, filtered compressed air. Clean the brake shoe using a wire brush or emery cloth. Do not wash the brake shoe in liquid. If the brake shoe is oil soaked, it must be replaced.

Inspection

All disassembled parts should be inspected to determine their fitness for continued use. Pay particular attention to the following:

1. Inspect all gears for worn, cracked, or broken teeth.
2. Inspect all bushings for wear, scoring, or galling.

Bushing Chart

LM (2 ton) Winches

Bushing Location	Bushing Item No.	Original Bore Size		Discard Bore Size	
		in.	mm	in.	mm
Frame (3)	2	1.315	33.4	1.375	34.9
Frame (3)	4	2.505	63.6	2.562	64.9
Frames(3) and (19)	16	1.753	44.5	1.815	46.1

HM (5 ton) Winches

Bushing Location	Bushing Item No.	Original Bore Size		Discard Bore Size	
		in.	mm	in.	mm
Frame (3)	2	1.437	36.5	1.5	38.1
Frame (3)	4	3.173	80.6	3.23	82.2
Frames(3) and (19)	16	2.037	51.7	2.1	52.3

(TBLBUSHINGS)

3. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace the shaft.
4. Inspect all threaded items and replace those having damaged threads.
5. Inspect the brake shoe lining for oil. If the brake shoe lining is oil-soaked, replace the brake shoe. If the brake shoe is glazed, sand it lightly using fine emery cloth.
6. Measure the thickness of the brake shoe lining. If the brake shoe lining is less than .062 in. (2 mm) replace the brake shoe (15).

Repair

Actual repairs are limited to the removal of small burrs and other minor surface imperfections from gears and shafts. Use a fine stone or emery cloth for this work.

1. Worn or damaged parts must be replaced. Refer to the applicable Parts Listing for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition. The cost of the part is often minor in comparison with the cost of redoing the job.
3. Smooth out all nicks, burrs, or galled spots on shafts, bores, pins, or bushings.
4. Examine all gear teeth carefully, and remove nicks or burrs.
5. Polish the edges of all shaft shoulders to remove small nicks which may have been caused during handling.
6. Remove all nicks and burrs caused by lockwashers.

Winch Assembly

1. Press new bushings (2), (4) and (16) into large frame (3) so they are 1/16 in. (2 mm) below the outer surface of the frame. Press bushing (16) into small frame (19). Check bores to ensure bushings do not restrict the grease fitting passages. If needed drill a 1/8 in. (3 mm) diameter hole through the bushing to provide a grease passage. Use the existing grease fitting hole as a guide. Install grease fittings (9) in large and small frames.
2. Install hub on the geared end of the drum (18) into large frame (3).
3. Assemble small frame (19) on opposite end of drum and locate frames with spacers (27) and nuts (1).
4. Slide dog (24) onto dog pin (22). Align cotter pin hole in dog pin with hole in large frame and drive dog pin into large frame. Install cotter pin (7). If a new dog pin is being used it will be necessary to drill a 3/16 in. (5 mm) diameter hole through the dog pin using the hole in the large frame as a guide.
5. Connect spring (26) between dog and large frame.
6. Install setscrew (11) and jam nut (10) in brake shoe block (14). Assemble brake lever (13), brake shoe block (14) and brake shoe to large frame (3) so the pivot hole in the brake shoe fits on the dog pin (22). Secure in position with cotter pin (21).

7. Connect spring (17) from brake shoe (15) to large frame (3). Install spring loaded lock dowel (30) in large frame (3) and secure with cotter pin (6). Cotter pin (6) must pass through slot and between spring coils in the spring loaded lock dowel (30).

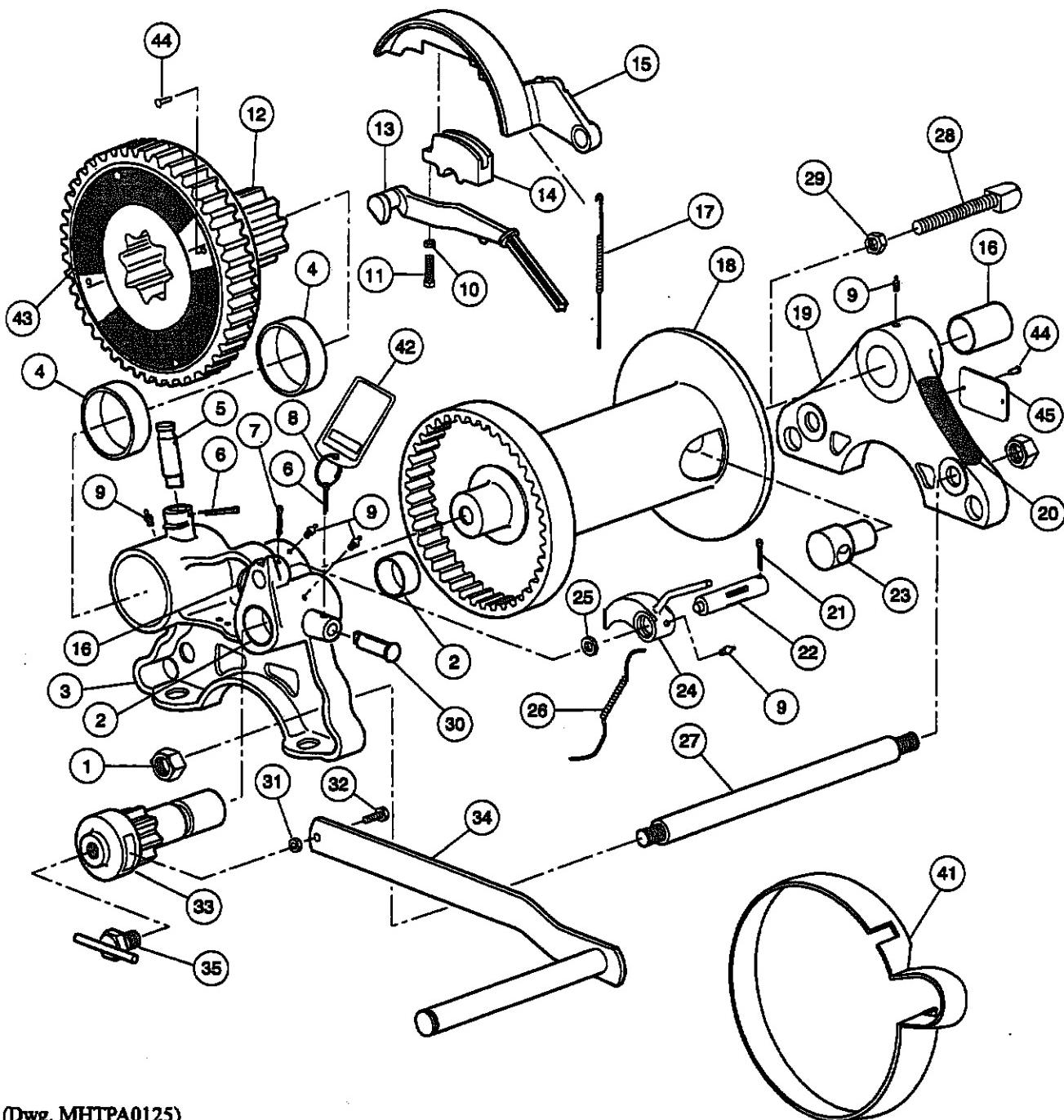
! CAUTION

- The flat of the 90 degree cut out in the spring loaded lock dowel must face toward the drum.
8. Install gear (12) in large frame so pinion teeth mesh with drum gear teeth. Install dowel (5) and secure in position with cotter pin (6).
 9. Check movement of dog and that it freely clicks into position against the teeth on the gear (12).
 10. Adjust brake shoe in accordance with instructions for drum brake adjustment in the "MAINTENANCE" section.
 11. Install pinion (33) in large frame (3). Ensure the spring loaded lock dowel (30) is fully engaged in the pinion shaft groove.
 12. Lubricate all grease fittings as instructed in the "LUBRICATION" section.
 13. Install handle (34) through the slot in the pinion (33), adjust to the required length and clamp in position with lock screw (35). Install handle retainer (32) and locknut (31) in the end of handle (34).
 14. Check that all warning labels and tags are attached to the winch and clearly visible. Test winch operation.

Test Check

Upon completion of all winch maintenance and repairs check winch operation following procedures in the "OPERATION" section.

L1 AND H1 WINCH ASSEMBLY DRAWING



(Dwg. MHTPA0125)

LM AND HM WINCH ASSEMBLY PARTS LIST

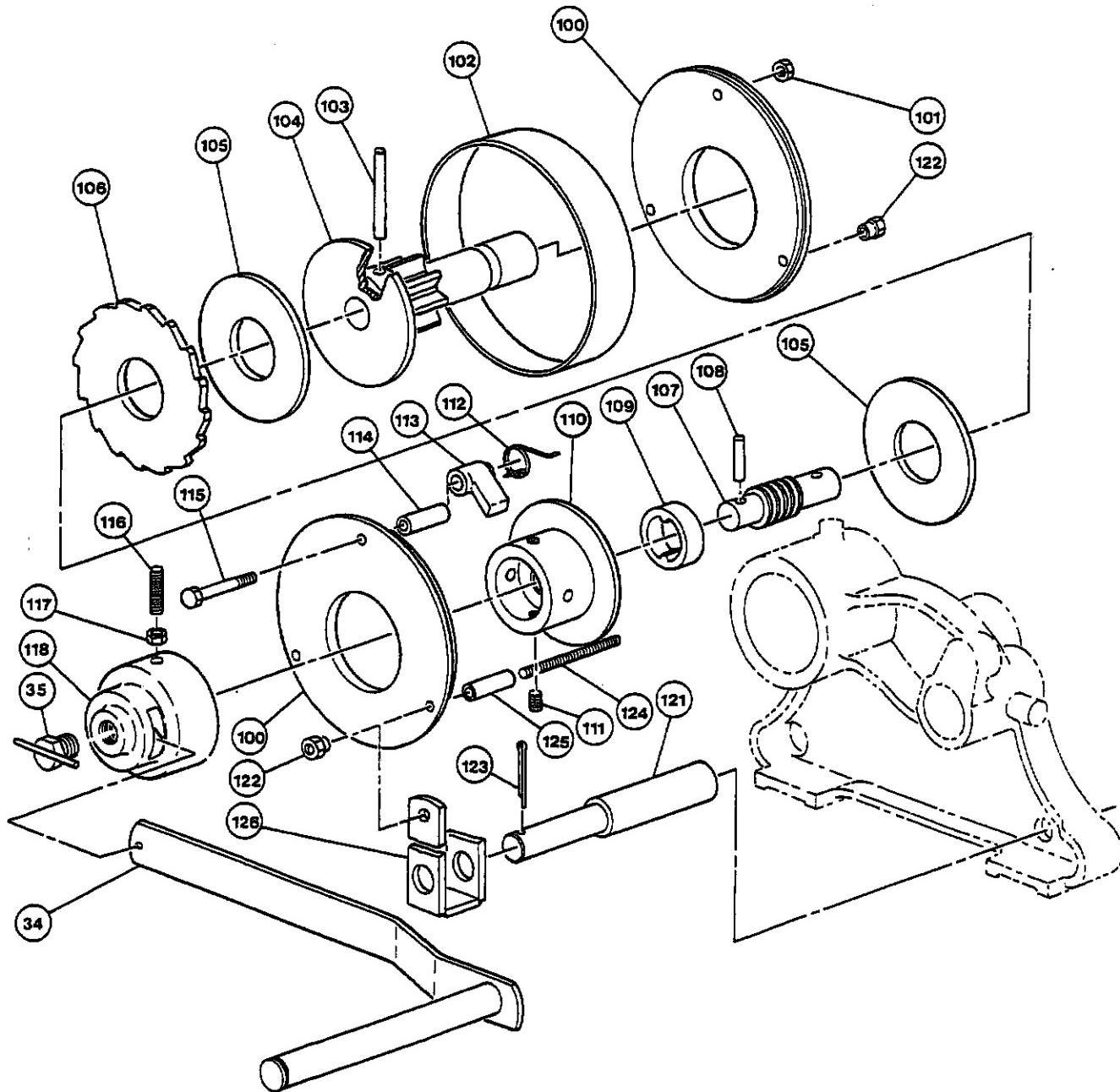
ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	
			LM (2 Ton)	HM (5 Ton)
1	Spacer Nut	4	52848	
2	Bearing Bushing	1	1288-1	1288-2
3	Large Frame	1		Not Sold Separately
4	Gear Bushing	1	1288-3	1288-6
5	Dog Pin	1	2901	
6	Cotter Pin	1	51021	
7	Cotter Pin	2	54725	
8	Label Ring	1	50040 (Refer to Kit Part Number 23223)	
9	Grease Fitting	5	53839	
10	Jam Nut	1	50161	
11	Setscrew	1	54691	
12	Brake Lever	1	462-2	1382
13	Brake Lever	1	1307	
14	Brake Shoe Block	1	937	
15	Brake Lever	1	1307	
16	Bearing Bushing	1	1288-2	1288-6
17	Brake Spring	1	1352	
18	Drum (All models and lengths)	1	172-1	258-2
19	Small Frame	1	1306-A	1302-A
20	IR-Logo Label	1	71106231 (Refer to Kit Part Number 23223)	
21	Cotter Pin	1	54447	54165
22	Dog Pin	1	38	39
23	Wire Rope Clamp (Incl's items 28 & 29)	1	407-B	307-B
24	Dog	1	Order Dog Assy 774	
25	Washer (without reversing dog)	1	50918	Order Dog Assy 795
	Washer (with reversing dog)	2		
26	Dog Spring (without reversing dog)	1	1353	
	Dog Spring (with reversing dog)	2		
27	Spacer (6 in. long drum)	2	279-1	---
	Spacer (10 in. long drum)		279-2	---
	Spacer (8 in. long drum)		---	281-2
	Spacer (12 in. long drum)		---	281-3
	Spacer (16 in. long drum)		---	281-4
	Spacer (24 in. long drum)		---	281-5
28	Wire Rope Clamp Setscrew	1	(71063796) Order item 23	
29	Wire Rope Clamp Locknut	1	(50914) Order item 23	
30	Spring (for dog assembly)	1		
31	Locknut	1	50852	
32	Handle Retainer	1	52856	
33	Handle Assembly (Standard)	1	52856	
34	Handle Assembly (Standard)	1	278	286
35	Lockscrew	1		239
41	Gear Cover (Optional)	1	250-B	249
42	Warning Tag	1	71056410 (Refer to Kit Part Number 23223)	
43	Warning Label	1	71064125 (Refer to Kit Part Number 23223)	
44	Drive Screw	6	50915 (Refer to Kit Part Number 23223)	
45	Nameplate	1	71064208-R (NOT SOLD)	
* 130	Reversing Dog	1	308	367

Recommended spare.

*Not shown on drawing.

(TBL IMPARTS)

LOAD DISC BRAKE ASSEMBLY DRAWING (OPTIONAL FEATURE)



(Dwg. MHTPA0256)

LOAD DISC BRAKE ASSEMBLY PARTS LIST (OPTIONAL FEATURE)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.	
			LM (2 Ton)	HM (5 Ton)
—	Load Disc Brake Assembly (Incl's items 34, 35 and 100 through 126)	1	3679-1	3677-1
34	Handle	1	278	286
35	Lockscrew	1	239	
100	Housing Plate	2	1999	
101	Nut	2	51682	
102	Housing Cylinder	1	1998	
103	Pin	1	3981	
104	Flange Head Pinion	1	2208	2005
105	Friction Disc	2	2207	
106	Ratchet Wheel	1	2178	
107	Actuating Screw	1	1992	
	Actuating Screw (Reverse Dog)		1992-1	
108	Pin	1	20466	
109	Retainer Bushing	1	1993	
110	Actuating Flange Nut	1	2004	
	Actuating Flange Nut (Reverse Dog)		2004-1	
111	Setscrew	1	50855	
112	Ratchet Dog Spring	1	2002	
113	Ratchet Dog	1	1996	
114	Spacer Sleeve	1	1996-1	
115	Capscrew	2	52831	
116	Setscrew	1	54173	
117	Nut	2	50198	
118	Handle Socket	1	1990	
121	Anchor Bar	1	2206	
122	Link Nut	2	2199	
123	Cotter Pin	1	51021	
124	Housing Anchor Stud	1	20465	
125	Spacer Sleeve	2	1997	
126	Anchor Bracket Link	1	2193	

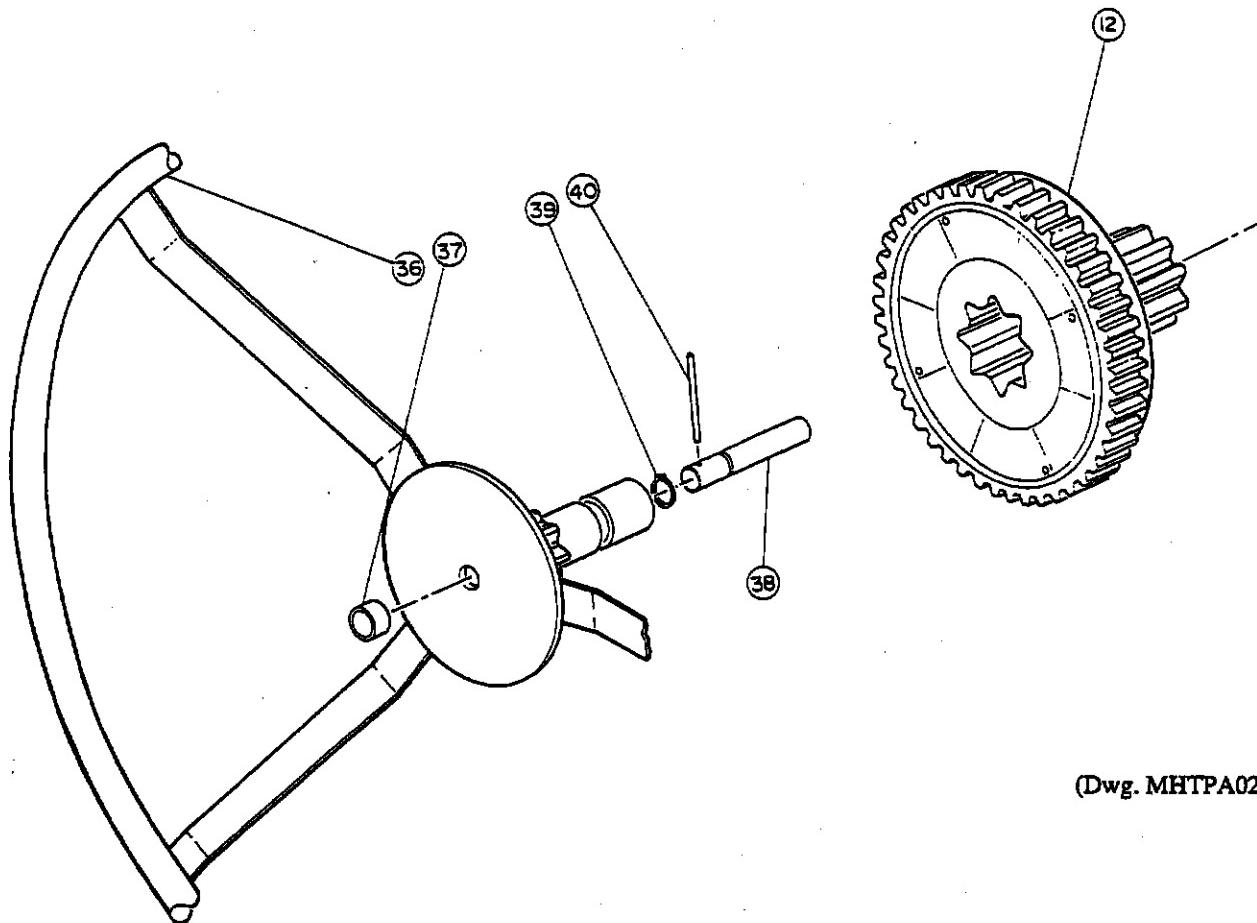
(TBL.LMHMPL2)

Assemblies

DESCRIPTION OF PART	PART NO.	
	LM (2 Ton)	HM (5 Ton)
Pinion and Handle Assembly (Incl's items 31 through 35)	287	289
Brake Assembly (Incl's items 10, 11, 13, 14, 15 and 17)	762	796
Load Disc Brake Assembly (Incl's items 34, 35, and 100 through 126)	3679	3677
Dog Assembly (Incl's items 9, 21, 22, 24, 25 and 26)	774	795
Tag and Label Kit (Incl's items 8, 20, 42, 43, and 44)	23223	

(TBLASSEMBLY)

HANDWHEEL ASSEMBLY DRAWING AND PARTS LIST (OPTIONAL FEATURE)



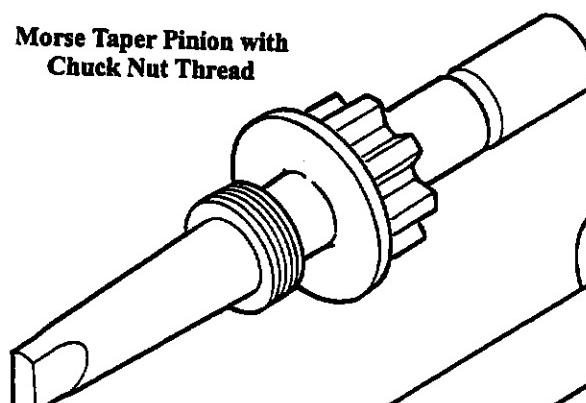
ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.	
			LM (2 Ton)	HM (5 Ton)
12	Gear	1	462-HM	158-HM
36	Handwheel 28 in. Dia. (optional feature)**	1	1580-2	1580-1
37*	Bushing	1	778	
38*	Sleeve Shaft	1	780B	
39*	Retainer Ring	1	71038939	
40*	Pin	1	71038947	

* Used only with optional Handwheel item 36.

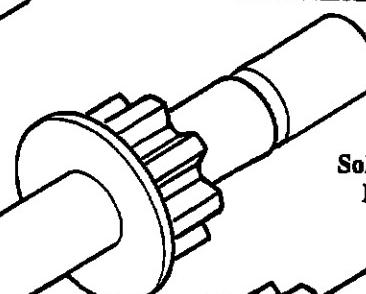
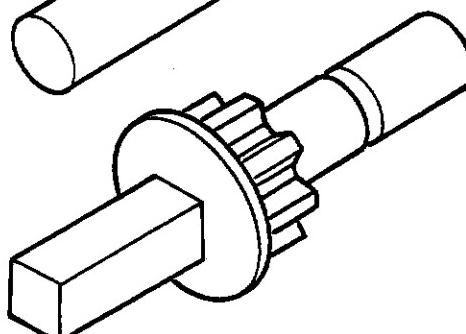
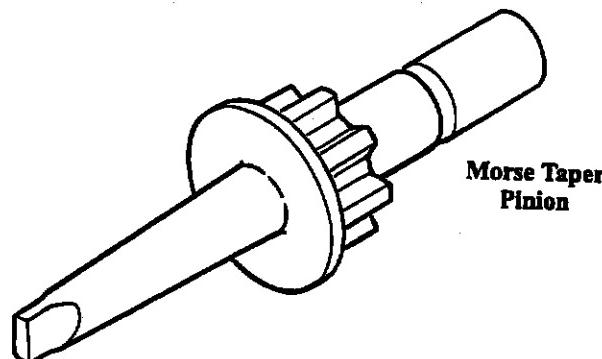
** Handwheel item 36 cannot be used with standard gears item 12 part numbers 462-2 (2 Ton) and 158-2 (5 Ton) shown on page 15.

(TBL.LMHMPL3)

OPTIONS AND ACCESSORIES

Morse Taper Pinion with
Chuck Nut Thread

Extended Shaft Pinion

Solid Head
PinionSquare Drive
Pinion (1 inch)

(Dwg. MHTPA0554)

DESCRIPTION OF PART	PART NO.	
	LM (2 Ton)	HM (5 Ton)
Touch-Up Paint		
Lubricant	FAP-237Y	
Available Pinion:	LUBRI-LINK GREEN	
Morse Taper Pinion No.3	1942	1948
Discontinued Pinions:		
Pinions listed below and shown in Dwg. MHTPA0554 are no longer available. The part numbers listed are for reference only. Contact your distributor or TSE International for assistance in replacing these parts.		
Extended Shaft Pinion		
Morse Taper Pinion No.4	2833	991
Morse Taper Pinion No.3 with Chuck Nut Thread	1943	1949
Morse Taper Pinion No.4 with Chuck Nut Thread	1944	1946
Solid Head Pinion	1945	1947
Square Drive Pinion (1 in.)	241	894
	4040	3458

(TBL.PINIONS)

SERVICE NOTES

SERVICE NOTES

PARTS ORDERING INFORMATION

The use of other than TSE International replacement parts may invalidate the Company's warranty. For prompt service and genuine TSE International parts, provide your nearest Distributor with the following:

1. Complete model number as it appears on the name plate.
2. Part number and part description as shown in this manual.
3. Quantity required.

The winch nameplate is located on the small frame (19).

Return Goods Policy

TSE International will not accept any returned goods for warranty or service unless prior arrangements have been made and written authorization has been provided from the location the goods were purchased.

NOTICE

- Continuing improvement and advancement of design may cause changes to this winch which are not included in this manual. Manuals are periodically revised to incorporate changes. Always check the manual edition number on the front cover for the latest issue.

Disposal

When the life of the winch has expired, it is recommended that the winch be disassembled, degreased and parts separated as to materials so that they may be recycled.

For additional information contact:

TSE International Inc.
5301 Shreveport/Blanchard Hwy.
Shreveport, La. 71107
Phone: (318) 929-2368
1-800-825-2402
Fax: (318) 929-4853

WARRANTY**HOIST AND WINCH LIMITED WARRANTY**

TSE International Inc. (TSE) warrants to the original user its Hoists and Winches (Products) to be free of defects in material and workmanship for a period of one year from the date of purchase. TSE will repair, without cost, any Product found to be defective, including parts and labor charges, or at its option, will replace such Products or refund the purchase price less a reasonable allowance for depreciation, in exchange for the Product. Repairs or replacements are warranted for the remainder of the original warranty period.

If any Product proves defective within its original one year warranty period, it should be returned to any Authorized Hoist and Winch Service Distributor, transportation prepaid with proof of purchase or warranty card.

This warranty does not apply to Products which TSE has determined to have been misused or abused, improperly maintained by the user, or where the malfunction or defect can be attributed to the use of non-genuine TSE parts.

TSE makes no other warranty, and all implied warranties including any warranty of merchantability or fitness for a particular purpose are limited to the duration of the expressed warranty period as set forth above. TSE's maximum liability is limited to the purchase price of the Product and in no event shall TSE be liable for any consequential, indirect, incidental, or special damages of any nature rising from the sale or use of the Product, whether based on contract, tort, or otherwise.

Note: Some states do not allow limitations on incidental or consequential damages or how long an implied warranty lasts so that the above limitations may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

IMPORTANT NOTICE

It is our policy to promote safe delivery of all orders.

This shipment has been thoroughly checked, packed and inspected before leaving our plant and receipt for it in good condition has been received from the carrier. Any loss or damage which occurs to this shipment while enroute is not due to any action or conduct of the manufacturer.

VISIBLE LOSS OR DAMAGE

If any of the goods called for on the bill of lading or express receipt are damaged or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt.

CONCEALED LOSS OR DAMAGE

When a shipment has been delivered to you in

apparent good condition, but upon opening the crate or container, loss or damage has taken place while in transit, notify the carrier's agent immediately.

DAMAGE CLAIMS

You must file claims for damage with the carrier. It is the transportation company's responsibility to reimburse you for repair or replacement of goods damaged in shipment. Claims for loss or damage in shipment must not be deducted from the TSE International invoice, nor should payment of TSE International invoice be withheld awaiting adjustment of such claims as the carrier guarantees safe delivery.

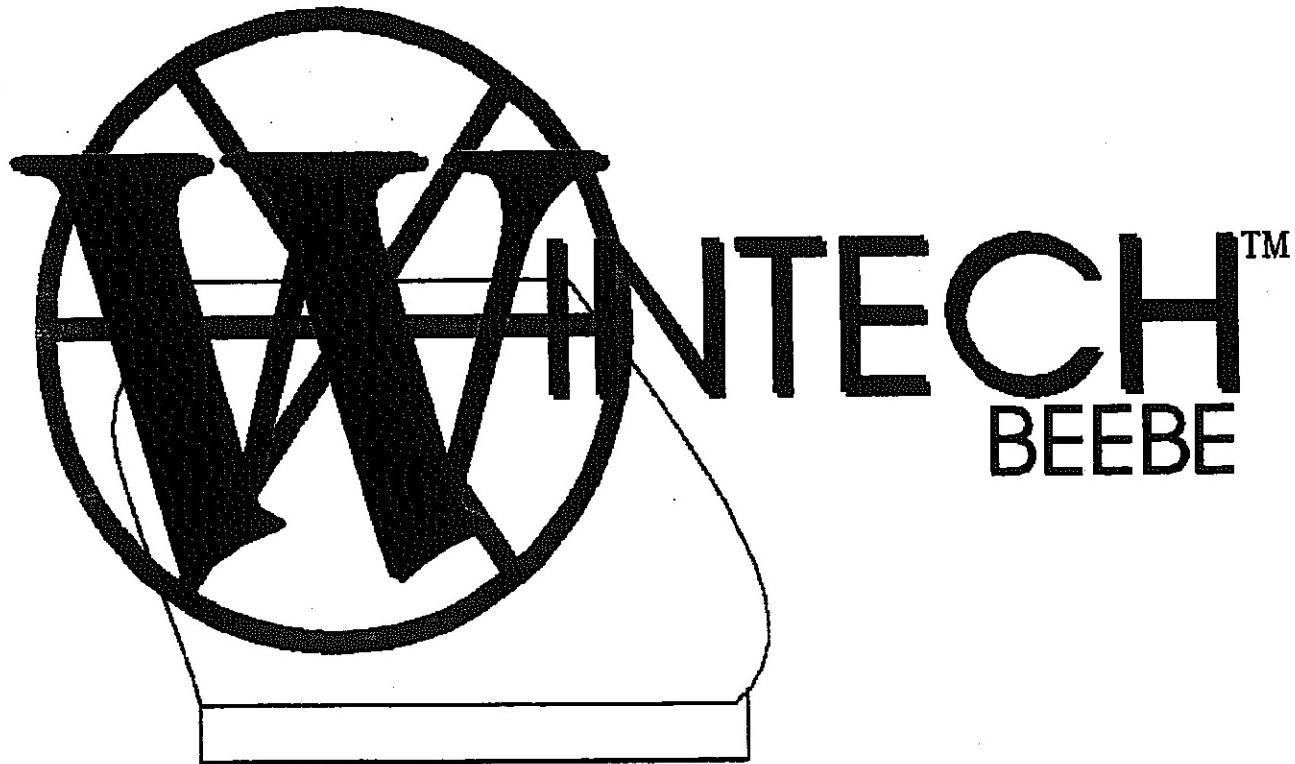
You may return products damaged in shipment to us for repair, which services will be for your account and form your basis for claim against the carrier.

United States Office Location

**For Order Entry, Order Status, and
Technical Support:**

**TSE International Inc.
5301 Shreveport/Blanchard Hwy.
Shreveport, LA. 71107**

**Phone: (318) 929-2368
1-888-946-8325
Fax: (318) 929-4853**



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TSE makes no other warranty, and all implied warranties including any warranty of merchantability or fitness for a particular purpose are limited to the duration of the expressed warranty period as set forth above. TSE's maximum liability is limited to the purchase price of the Product and in no event shall TSE be liable for any consequential, indirect, incidental, or special damages of any nature rising from the sale or use of the Product, whether based on contract, tort, or otherwise.

Note: Some states do not allow limitations on incidental or consequential damages or how long an implied warranty lasts so that the above limitations may not apply to you.

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